letters

continued from page 15

think, and a Pyrrhic victory. Am I alone in my distress? How do your readers feel about this?

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Errata available

My book, *Stochastic Systems*, (Academic Press, 1983), has some uncorrected errors on pages 232–233 that detract from the comparisons being made. The corrected solution by the decomposition method is $y = 1 + t + t^2 + (4/3)t^3 + \ldots$ which makes the superior accuracy as well as the computability quite evident. A one-page errata sheet is available to all past buyers by writing to me at the Center for Applied Mathematics, University of Georgia (Tucker Hall), Athens, GA 30602. New purchases from Academic will contain the correction. I apologize to all buyers for the inconvenience.

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Discovery of the neutron

In his "History of medical physics" (July, page 26) John Laughlin repeats an error concerning the discovery of the neutron that has been faithfully handed down for five decades. Although they are not named in the article, most readers familiar with the matter will recognize the "scientists at Giessen" to be Walther Bothe and Heinrich Becker, as the neutron story has been recounted in many papers on the history of nuclear physics, papers on which Laughlin presumably relied. Other attempts[1] to set the record straight have had no observable effect, but justice to an admirable man and skilled experimentalist compels me to make another attempt. Briefly, the conventional story of the neutron's discovery begins with Bothe and Becker bombarding Li, Be and B with alpha particles from polonium. Their efforts are rewarded by the discovery of a very penetrating radiation, which they identify as gamma radiation.[2] Irène Curie and Frédéric Joliot confirm these findings and observe that the radiation produces recoil protons,[3] which they attribute to extraordinarily high energy photons. James Chadwick then demonstrates that the penetrating radiation results from neutrons.[4]

Implied in this, and often explicitly stated, is Bothe's failure to recognize neutrons when he encountered them. The truth is that Bothe never encountered neutrons, as reading his paper will disclose. His detector was a metal-walled, air-filled Geiger tube, which would have been insensitive to neutrons and would have responded to them in the same way as to gamma rays. Modern investigators know that distinguishing neutrons from gammas is still not trivial. What Bothe observed was the gamma radiation from the first excited state of C^{12}, produced in Be^9 $(\alpha,n)C^{12*}$(4.43 MeV), the most penetrating radiation that had been observed until then in a laboratory experiment, and which is produced in comparable amounts to ground-state neutrons.[5] Even if hydrogenous material had been incorporated into the detector, it is doubtful that he would have noted any recoil protons because his alpha source was very much weaker than those used by either Chadwick or Curie and Joliot. It was, in fact, a tribute to his observational skill that he was able to do the experiment at all.

References

1. R. Fleischmann, Naturwiss. **38**, 465 (1951); **44**, 457 (1957).
2. W. Bothe and H. Becker, Z. Physik **66**, 289 (1930).
3. I. Curie and F. Joliot, Comptes Rendus **194**, 273 (1932).
4. J. Chadwick, Nature **129**, 312 (1932).
5. A. W. Obst, T. B. Grandy and J. L. Weil, Phys. Rev. **C5**, 738 (1972).

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THE AUTHOR COMMENTS: The revered memory of Walther Bothe needs no defense for any statement in my paper, but I do appreciate the intent of the communication from Louis Brown. As stated precisely in the paper, Bothe and Becker[1] did report radiation more penetrating than radium gamma rays. Since James Chadwick, in his announcement of his discovery of the neutron[2], cited the work by Bothe specifically, it is an historical necessity to refer to Bothe's work. In fact, the first sentence as well as other comments in Chadwick's short article announcing the neutron (less than one page in *Nature*) were directed to Bothe's experiments. Chadwick had the advantage of working with Ernest Rutherford in his laboratory and had the benefit of his insight. Rutherford had postulated the existence of neutral nucleons in 1920 in his Bakerian lecture.[3] Chadwick also employed an ionization chamber and an amplifier that distinguished between the pulse heights of electrons and heavier particles. When Irène Curie and Frédéric Joliot had repeated Bothe's experiment previously, they did add the use of